

Effectiveness of Fertilization Methods and Organic Compost in Inceptisol Soil Planting Media on Growth of Main Nursery Palm Oil Seedlings

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ABSTRACT

Achievement and Success in Increasing Plant Growth is by Fertilising the Right Target and Method. Optimisation with inorganic fertilization may not be successful if the soil is not sufficient in nutrients. To fertilise the soil, it must be done by giving organic material, so that the soil is fertile. We are a large-scale manufacturer specialising in producing various mining machines including different types of sand and gravel equipment, milling equipment, mineral processing equipment and building materials equipment. Therefore, the right target, method and dose will determine the growth and development of palm oil plants in the Main Nursery. The research was conducted at the Field Laboratory of Soil Management, Conservation at the Institut Teknologi Sawit Indonesia, Medan. Soil Observations at the Soil, Plant, Fertilizer and Water Laboratories at the Agricultural Technology Assessment Centre, Johor, Sumatera Utara. The data results show that the parameters of Plant Height, Stem Circumference, Number of Leaf Sheaths and Leaf Sheaths Length have the highest average numbers in the pocket Method, as well as in the Fresh Weight of Roots, Crowns, Dry Weight of Roots, Crowns also have the highest average numbers in the Pocket Method compared to the Sow, Sachet and Drip Fertigation Methods. This indicates that the growth of seedlings of PPKS 718 and PPKS 239 varieties is best in the Pocket Fertilization Method rather than the Sow, Sachet, and Drip Fertigation Methods.

Keywords: *main nursery, pocket, sow, sachet, drip fertigation*

INTRODUCTION

Palm Oil nursery is the main thing that determines the success of planting in the field. In addition to fertilization, the presence of soil microbes also determines the growth and plants are very good and good. the function of microbes is to provide nitrogen and calcium nutrients needed by plants. Therefore, the accuracy of the fertilizer dose during the seedling process is a very important

factor. One of the efforts to increase growth and development can be done by fertilising effectively and efficiently. Among the three macro-nutrients (N, P, K, Mg, Ca, S.), Nitrogen is a priority in the main needs of the main nursery stage of palm oil which plays a role in the formation of leaves, both in area, green colour of the leaves, and others as a photosynthetic process. Nitrogen (N) uptake

efficiency is the ratio between nutrients absorbed from fertilizers and the amount applied, expressed in percent. The uptake efficiency figure is useful as a correction factor in fertilizer recommendations (Tambunan *et al.*, 2014).

The content of liquid fertilizer is something that needs to be considered is the time of application. The time of fertilizer application also determines plant growth. So, by optimising the nutrient needs of plants can meet the needs of plants (Afidah *et al.*, 2018). Paper filter sachet bags are made of small paper with loose fibres which are often used as filters for tea powder and the use of these sachet bags in fertilizers in fertilization is to filter fertilizers and so that the filtered fertilizer will be immediately liquid and clean so that it is more effective in absorbing nutrients by the roots of the plant (Mulyana, 2019 in Wahyuni and Sakiah, 2019).

The fertilization method that is used directly on the root area so that it is directly absorbed and irrigated is the drip fertigation method. This

fertilization is aimed at plant roots so that they can directly absorb fertilizer nutrients that have been diluted with water and flowed so that when dissolved it will facilitate absorption in plant roots (Elonard and Sembiring, 2020; Budianto and Rosmiyati, 2021).

Basically, organic fertilizers and inorganic fertilizers are needed by plants and also for soil weakening so that soil that lacks nutrients becomes fertile due to the presence of organic and inorganic materials. This is in accordance with the opinion of Afidah *et al.* (2018) which states that the addition of organic matter is able to increase soil aggregation, improve aeration and percolation, and make the soil structure looser and easier to process.

In addition, Yosephine *et al.* (2022) added that market waste organic fertilizer contains essential macro elements such as nitrogen 0.60% (N), phosphorus 0.30% (P), potassium 0.34% (K), calcium 0.12% (Ca), magnesium 0.10% (Mg), and sulfur 0.09% (S).

MATERIALS AND METHODS

The research was carried out in the nursery of the Soil Management Field Laboratory of the Institut Teknologi Sawit Indonesia, Medan. The time of research was carried out for 7 months from March to September 2024. The structure of this study was based on 2 factor in the study, namely factor 1 in Palm Oil Seed Varieties with 2 Levels of comparison, factor 2 of Fertilization Methods with 4 levels of comparison.

The spacing of the nursery is 70 x 70 x 70 cm with a distance between trees of 32 cm and a distance between rows of plants of 62 cm. The study used factorial complete Randomized Block Design (RBD) with a combination of 2 x 4 treatments (Tambunan *et al.*, 2015).

Palm oil varieties with 2 levels of comparison: 1. Varieties PPKS 718, 2. Varieties PPKS 239 from PPKS Medan which was taken 3 months old from PPKS Sei Pancur Nursery, Tanjung Morawa, Sumatera Utara, top soil with inceptisol soil type from Tanjung Morawa, river

sand as a mixture of planting media, water as a watering medium. N.P.K + Mg + Ca 16.16.16 + 0,5 + 6 compound fertilizer as research fertilizer.

Fertilization Methods Application with 4 levels of comparison: 1. Pocket Fertilization System, 2. Sow Fertilization System, 3. Sachet System, 4. Drip Fertigation System. RP (Rock Phosphate) fertilizer as initial root fertilizer during transplanting from PN (Pre Nursery) to MN (Main Nursery).

Research Steps with making organic vegetable compost. The vegetable compost used take from Pasar Raya MMTTC Pancing, Medan. Vegetable is selected that is still fresh until slightly wilted and not rotten. The vegetable used to make organic humus is 25 kg. After collecting, the material is chopped into small pieces so that it is easier to decompose and after that, Effective Microorganisme-4 (EM4) bioactivator and 5 liters of water are given so that the ratio of vegetable : water : EM-4 is 25 : 5 : 1. Composting is carried

out using an anaerobic system, so that humus maturity is faster. The humus was closed for 35 days – 40 days, but the humus was checked every 3 days. One of the characteristics of mature compost is that it has a crumb texture, does not smell, the material is not recognized again and does not have caterpillars.

Mature compost also has a C/N of 10/20 and a pH of 6.5 - 7.0. After the compost is finished, the compost is started to be applied to the planting

media according to the treatment given. The weight of the soil given in the polybag is 6 kg.

Observation Parameters and Indicators: Plant Height (cm), Number of Leaf Sheaths (fronds), Plants Stem Circumference (cm), Leaf Sheath Length (cm). Analysis of Fresh Weight and Dry Weight: Root Fresh Weight (g), Crown Fresh Weight (g), Root Dry Weight (g), Crown Dry Weight (g), Preliminary Soil Analysis.

RESULTS AND DISCUSSION

Soil Characteristic for Planting Media

The soil used as a Planting Media for Palm Oil in the Main Nursery is Top Soil with Inceptisol Soil type taken from Tanjung Morawa, Deli :

Serdang Regency, Sumatera Utara. To determine the results of the initial soil analysis, several observation parameters were analysed, as listed in Table 1. as follow

Table 1. Preliminary Analysis of Soil as a Planting Media

Texture	Method of Analysis	Units	Results	Description
Sand	IK 0.1.9.0 (Hydrometer)	%	89,72	Loam Sandy
Dust			17,20	
Clay			2,55	
C-Organic	IK 0.1.5.0 (Spectrofotometry)	%	4,93	h
N-Total	IK 0.1.6.0 (Kjedhal)	%	0,57	h
P ₂ O ₅ -avl (P-Bray I)	IK 0.1.7.0 (Spectrofotometry)	ppm P	1,90	vl
K ₂ O Potential Ex. HCl 25%	AAS/Asam Acetat 1N	me.100 g ⁻¹	0,12	vl
CEC	Volumetry/NaCl 10%	me.100 g ⁻¹	40,12	h
pH H ₂ O	IK 0.1.3.0 (Elekrometry)	---	6,5	h (A bit Sour)
Al-dd	IK 0.1.4.0 (Titrimetry)	me.100 g ⁻¹	0	nm
Ca-dd	IK 0.1.8.0 (AAS)	me.100 g ⁻¹	5,20	l
K-dd	IK 0.1.8.0 (AAS)	me.100 g ⁻¹	0,16	l
Mg-dd	IK 0.1.8.0 (AAS)	me.100 g ⁻¹	2,11	h

Description: Criteria for Planting Media, h = High, l = Low, m = Medium, sl = Slightly Low, vl = Very Low, vh = Very High, nm = Not Measurable

In the laboratory analysis results, it can be seen that the soil is textured with a class of Loamy Sand. The soil texture of sand fraction is 89.72%, dust fraction is 17.20%, clay fraction is 2.55%. Soil texture is a very determined comparison of the three fractions, namely the sand, dust, and clay fractions. in palm oil plants in nurseries, suitable soil media as a place of growth is textured sand to loam where the sand fraction is >80%. loam (sand 52%, dust 50%), and clay ranges <10%. The lower the clay content, the better the growth and development of palm oil seedlings due to pore space and soil aggregates that allow better root growth (Ruhnayat and Martini, 2015).

Soil H₂O pH is 6.5 with slightly acidic criteria. In this case it has explained that soil pH from the range of 5.5 - 7.0, is a very good pH for Palm Oil growth because the pH condition point is slightly acidic to acidic making one of the factors to determine the success of growth, and bacteria and fungi in the soil can breed well and can decompose organic matter in the soil (Siswanto, 2018; Novizan, 2018; Hadad *et al.*, 2018).

C-Organic content shows high criteria results. this is said that the level of soil fertility is good. C-Organic content is a determinant of mineral soil quality. the higher the total C-Organic content, the better the quality of mineral soil (Siregar, 2017). Organic matter has an influence on the level of CEC (Cation Exchange Capacity),

where the role of microorganisms that decompose organic matter into humus needed by plants, so that it can determine the increase in soil CEC (Sutanto, 2002).

Lack of Nitrogen (N) in the soil will inhibit plant growth. The content of nitrogen (N) nutrients in the soil must be available where the range of >0.31% can be absorbed by plants. The low content of N in the soil is caused by several factors, namely leaching, denitrification, volatilisation, fixed by minerals or consumed by soil microorganisms, and the content of N levels has the main function, namely as an ingredient in the synthesis of chlorophyll, proteins, and amino acids (Yosephine *et al.*, 2022).

The availability of Phosphor (P) in the soil can be caused by pH, organic matter, and soil texture, so it becomes a limiting factor in the growth of palm oil seedlings, and to increase the phosphorus content in the soil, P must be given more than other fertilizers (Hadi *et al.*, 2014).

Potassium (K) levels in the soil can be influenced by soil parent material. so it is easily mobile and also the K content is easily lost through leaching, or carried away by water movement. this is because that the K content levels are in mineral soils that lack the influence of water (H₂O) containing CO₂ due to low K capacity and stability easily leached (Sofyan, 2000 in Agoesdy *et al.*, 2019).z

Plant Growth

Plant Height

The results of the measurement test from observing the height of the palm oil seedlings can be seen in Table 2 as follows:

Table 2. Average Plant Height (cm) 28 WAP

Variety	Fertilization Methods				Average Vn
	Pocket	Sow	Sachets	Drip Fertigation	
	 cm				
PPKS 718	61,2 d	60,0 d	57,2 c	59,7 c	59,5 b
PPKS 239	44,7 ab	43,2 a	41,2 a	43,6 a	43,2 a
Total V x F	105,9	103,2	98,4	103,3	
Average Fn	53,0 b	51,6 a	49,2 a	51,7 a	

Description: Number followed by the same index in the same row or column showed no the significant difference according to the DMRT test (*Duncan's Multiple Range Test*) 95% confidence level ($\alpha = 0,05$)

In Table 2. It is explained that the growth of palm oil seedlings from the age of 4 WAP to 28 WAP shows an increase in the growth of palm oil seedlings with an average of 60.0 cm in the PPKS 718 seedling variety, and an average of 43.2 cm in PPKS 239 seedlings. It was observed that the fertilizer method treatment showed the highest average of 61.2 cm in the pocket method for the PPKS 718 variety, while the PPKS 239 variety had an average of 44.7 cm in the pocket method. Not significantly different from the sowing method which has an average of 60.0 cm for the PPKS 718 variety and 43.2 cm for the PPKS 239 variety.

It can be concluded that the pocket fertilization method can provide better results, as well as the right target and the right method given. The pocket fertilization method shows more effectiveness because mineral nutrients can be absorbed directly by plants in the soil, and the planting media is also directly moistened by water. The results of the research at 8 WAP to 28 WAP on the PPKS 718 and PPKS 239 varieties of palm oil seedlings increased 100% in the pocket fertilization methods.

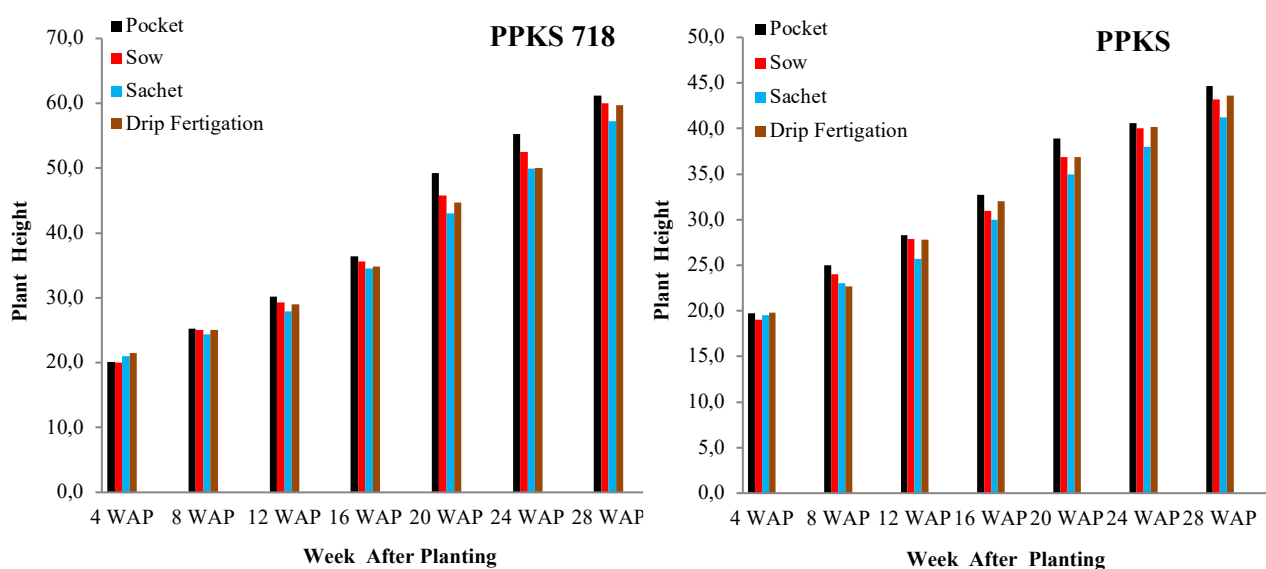


Fig 1. Graph of Mean Plant Height (cm) age 4 – 28 Week After Planting (WAP)

In this observation, the treatment of pocket fertilization method on palm oil seedlings of PPKS 718 and PPKS 239 varieties makes the growth better and more fertile but not significantly different from sowing compared to the Sachet fertilization method and Drip Fertigation. This

indicates that plant growth and development in the height of palm oil seedlings in the Main Nursery shows a positive response to the pocket fertilization method, and shows different growth responses (Lubis *et al.*, 2023)

Stem Circumference

The results of the measurement test from observing the stem circumference of the palm oil seedlings can be seen in Table 3 as follows:

Table 3. Average Plant Stem Circumference (cm) 28 WAP

Variety	Fertilization Methods				Average Vn
	Pocket	Sow	Sachet	Drip Fertigation	
	 cm				
PPKS 718	8,9 c	7,9 b	6,4 a	8,2 b	7,9 a
PPKS 239	7,9 b	7,9 b	7,3 ab	7,9 b	7,8 a
Total V x F	16,8	15,8	13,7	16,1	
Average Fn	8,4 c	7,9 ab	6,9 a	8,1 ab	

Description: Number followed by the same index in the same row or column showed no the significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ($\alpha = 0,05$)

Based on Table 3. that the stated stem circumference of palm oil seedlings at the age of 4 WAP to 28 WAP shows an increase in the stem circumference of palm oil seedlings which is 7.9 cm in the PPKS 718 variety while the average is 7.8 cm in the PPKS 239 variety. The stem circumference of the PPKS 718 variety has an average of 8.9 cm for the pocket fertilization method and the PPKS 239 variety has an average of 7.9 cm for the pocket fertilization, sowing and

drip fertigation methods, these results are not significantly different between the three methods on the PPKS 239 variety.

The results of the analysis are known to be significantly different from the sowing, sachet and drip fertigation fertilization methods. The highest number was in the PPKS 718 variety with an average of 8.9 cm.

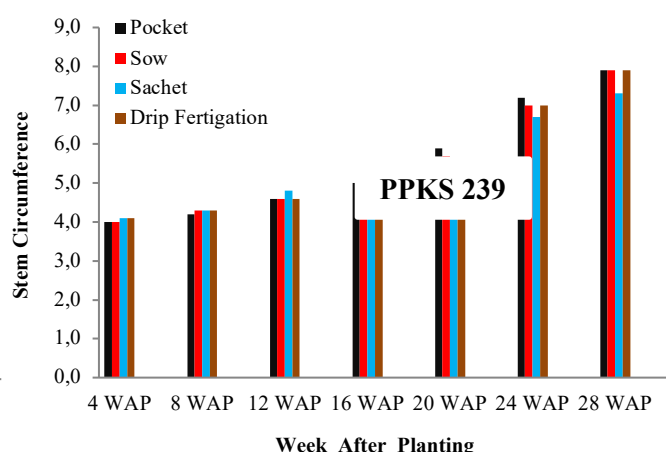
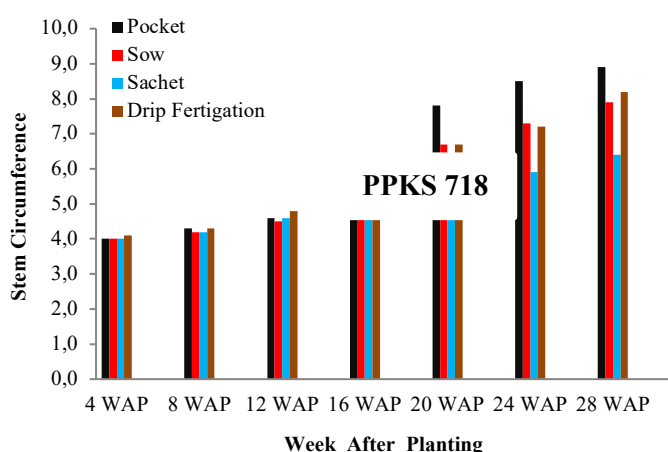


Fig 2. Graph of Mean Stem Circumference of Plant (cm) age 4 – 28 Week After Planting (WAP)

It is known that, the growth of stem circumference of palm oil seedlings in PPKS 718

and PPKS 239 varieties shows that the growth of stem circumference that occurs so significantly

occurs in the pocket fertilization method. It is stated that the pocket fertilization method is better because the direct mineral nutrient cycle makes the growth and development of stem circumference greater, and mineral nutrients are sufficient for plants, so that palm oil seedlings grow better. The

NPK + Mg + Ca compound fertilizer factor by applying the pocket method will make plants absorb nutrients faster, and the growing medium before putting fertilizer must be wetted first, allowing nutrient absorption to be well absorbed into all parts of the roots (Lubis *et al.*, 2023).

Number of Leaf Sheaths

The results of the measurement test from observing the number of leaf midribs of palm oil seedlings can be seen in Table 4 as follows:

Table 4. Average Number of Leaf Sheaths of Plant (fronds) 28 WAP

Variety	Fertilization Methods				Average Vn
	Pocket	Sow	Sachet	Drip Fertigation	
	 Fronds				
PPKS 718	9,2 c	PPKS 718	8,2 a	8,7 ab	PPKS 239
PPKS 239	9,1 c		7,9 a	8,9 ab	
Total V x F	18,3	17,6	16,1	17,6	
Average Fn	9,2 c	8,8 ab	8,1 a	8,8 ab	

Description: Number followed by the same index in the same row or column showed no the significant difference according to the DMRT test (Duncan’s Multiple Range Test) 95% confidence level ($\alpha = 0,05$)

Based on Table 3, the results of the growth of the number of leaf midribs at the age of 4 WAP to 28 WAP in the PPKS 718 variety is an average of 8.7 midribs, while in the PPKS 239 variety is an average of 8.7 midribs. In the growth of leaf midribs of palm oil seedlings, the PPKS 718 variety has an average of 9.2 midribs in the pocket fertilization method treatment, and the PPKS 239

variety has an average of 9.1 midribs in the pocket fertilization method.

The results of the analysis of variance, that the treatment of fertilization methods gives a very real interaction effect on the treatment of several levels. Varieties also gave a positive reaction, but did not give real results on pocket fertiliser methods

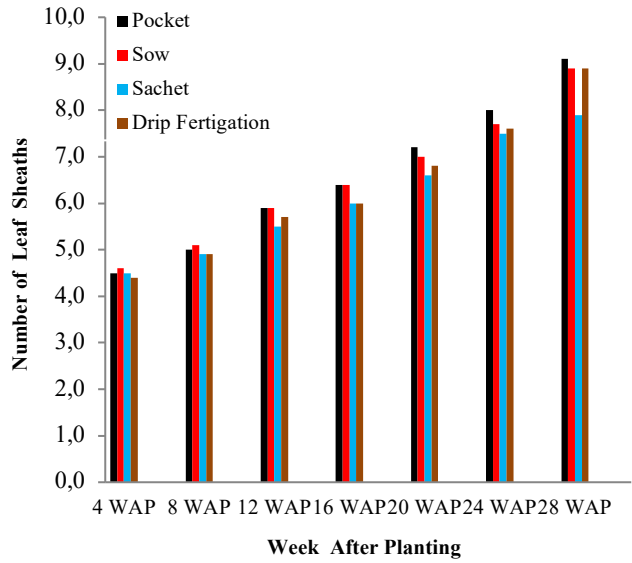
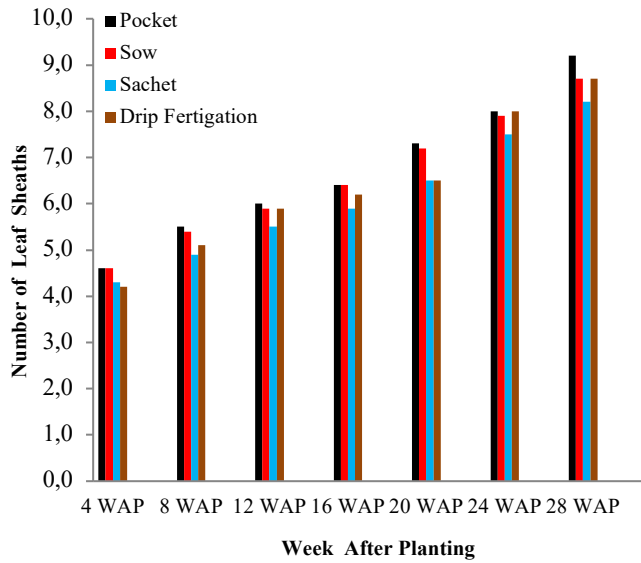


Fig 3. Graph of Mean Number of Leaf Sheaths (Fronds) age 4 – 28 Week After Planting (WAP)

Based on Figure 3, it can be seen that the PPKS 718 and PPKS 239 varieties in the pocket fertilization method treatment show a higher graph than the graph of the sowing, sachet, and drip fertilization methods. It can be seen at 16 WAP, that the pocket fertilization method has the same high graph as the sowing fertilization method.

This can be said that the genetic growth of the fronds began to elongate the fronds and growth at week 16 after planting and the application of fertiliser to plants with the pocket method will be well absorbed by palm oil plants due to the increase in age adjusted to the level of fertiliser given and

the application of fertiliser also without experiencing evaporation into the air, as well as nutrients leached by water flow (Lubis et al., 2023).

Basically, the pocket and sow fertilization methods applied to wet and moist planting media will be quickly absorbed by plant roots, as well as the sachet and drip fertigation methods, but sachets occur filtering and not all fertilisers can dissolve because they are above the soil surface, while drip fertigation, when dripped slowly, shows that nutrients are slowly available and slowly absorbed by plant roots, but better than the sachet method.

Leaf Sheath Length

The results of the measurement test from observing the length of the midrib of the leaves of the palm oil seedlings can be seen in Table 5 as follows:

Table 5. Average Leaf Sheath Length of Plant (cm) 28 WAP

Variety	Fertilization Methods				Average Vn
	Pocket	Sow	Sachet	Drip Fertigation	
	 cm				
PPKS 718	39,0 d	37,8 ab	36,0 a	37,5 ab	37,6 a
PPKS 239	38,9 c	37,0 ab	35,5 a	37,0 ab	37,1 a
Total V x F	77,9	37,0	71,5	74,5	
Average Fn	39,0 c	37,4 b	35,8 a	37,3 b	

Description: Number followed by the same index in the same row or column showed no the significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ($\alpha = 0,05$)

In Table 5, the average number of midrib lengths in the PPKS 718 variety is 37.6 cm, while in the PPKS 239 variety it is 37.1 cm. In the PPKS 718 variety with the pocket fertilization method makes the largest average of 39.0 cm, and in the PPKS 239 variety the pocket fertilization method makes an average of 38.9 cm.

With the results of DMRT (Duncan's Multiple Range Test) analysis on the length of the leaf midrib, significantly different in the interaction, it can be concluded that the pocket method treatment is the best effective treatment than the treatment of sowing fertilization methods, sachets and drip fertigation.

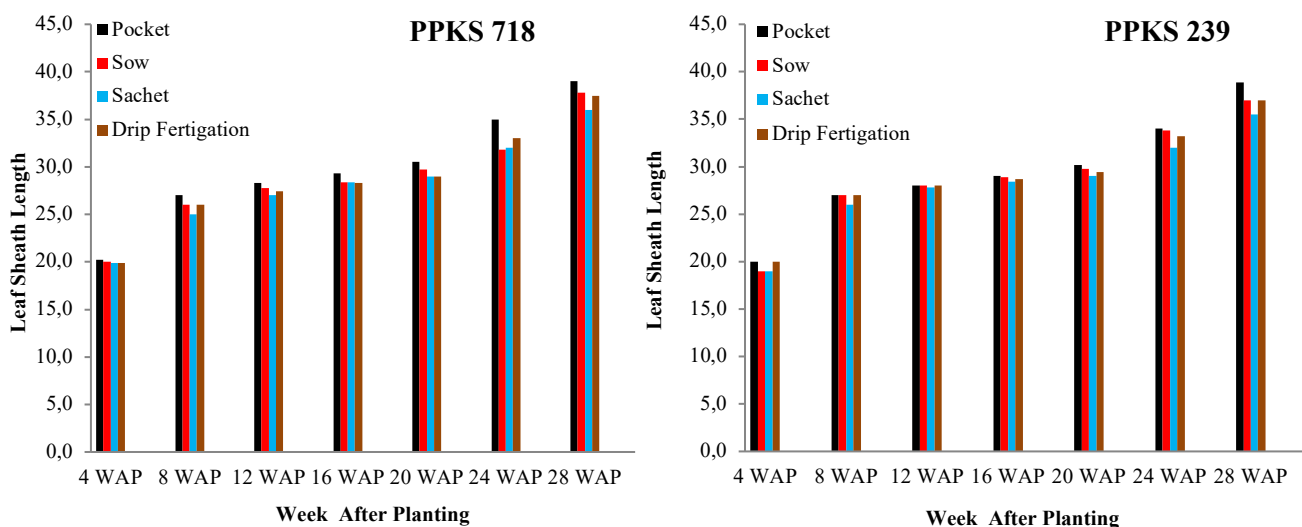


Fig 4. Graph of Mean Leaf Sheath Length (cm) age 4 – 28 Week After Planting (WAP)

In Figure 4, it is known that the growth and development of fronds on the length of the fronds of palm oil seedlings experienced rapid growth. The pocket fertilization method treatment is very significant compared to the sowing, sachet and drip fertilization methods. However, in this case, sowing is better and the interaction is so positive on the growth of leaf midribs compared to the fertigation drip fertilization method which is given

liquid but slow droplets are absorbed by plant roots and so are sachets (Lubis et al., 2023).

This is due to the availability of nutrients that are very available so that it affects the metabolic processes in plant tissues and makes the formation and elongation in the leaf midrib in the growth and development of palm oil seedling leaves.

Header Fresh Weight

The results of the statistical analysis showed that the application of fertilization methods of the varieties of palm oil seedlings in the main nursery and the interaction between the two treatments showed a very significant effect on the canopy fresh weight parameters.

The results of the measurement test from observing the fresh weight of the canopy of the palm oil seedlings can be seen in Table 6 and Figure 5 as follows:

Table 6. Average Fresh Weight of Canopy of Palm Oil Seeds (g) at 28 WAP

Variety	Fertilization Methods				Average Vn
	Pocket	Sow	Sachet	Drip Fertigation	
	 g				
PPKS 718	98,6 c	96,2 b	89,7 a	90,0 a	93,6 a
PPKS 239	97,8 c	95,0 b	88,0 a	91,2 a	92,3 a
Total V x F	196,4	191,2	177,7	181,2	
Average Fn	98,2 c	95,6 b	88,9 a	90,6 a	

Description: Number followed by the same index in the same row or column showed no the significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ($\alpha = 0,05$)

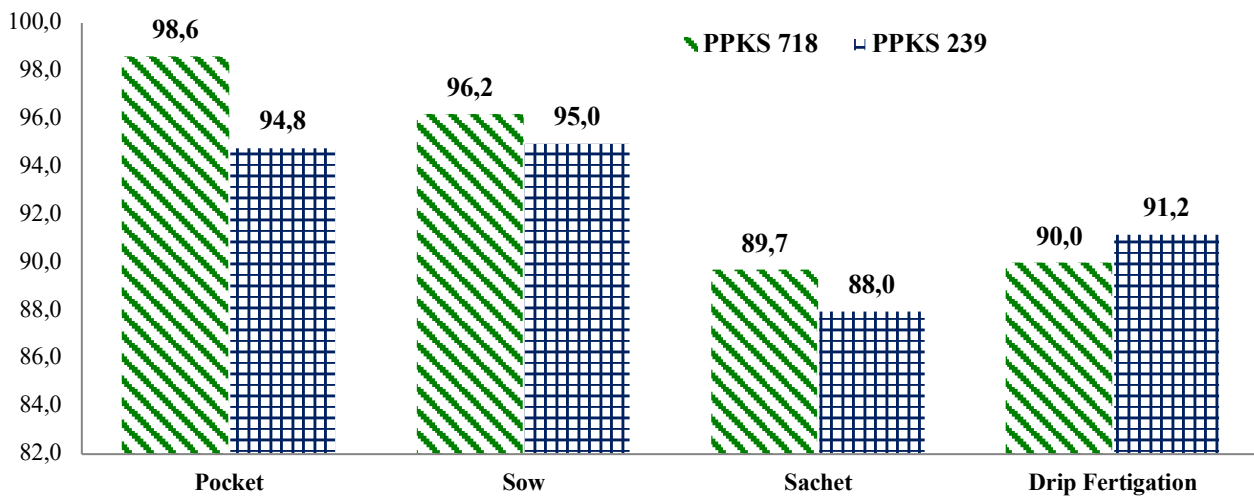


Fig 5. Graph of Average Fresh Weight of Canopy of Palm Oil Seedlings at 28 WAP

Based on the results of the study, that the treatment of pocket fertilization method gives the highest weight of 98.6 g in PPKS 718 varieties and PPKS 239 varieties have an average of 95.0 g in the sowing fertilization method. This shows that the sowing fertilization method treatment is appropriate for plants and the pocket fertilization method also gives the highest crown fresh weight results.

The response of plants in palm oil seedling varieties is the increase in crown fresh weight, due

to the role of macro nutrients applied in the right way given and the response of organic compost applied to the planting media is very good for plants, because the nutrients given in organic compost make plant nutrients sufficient both in plants and soil.

The nutrients of NPK + Mg + Ca compound fertiliser given in the pocket and sowing method cause the photosynthate cycle to be allocated to the crown of the plant resulting in an increase in crown weight (Lubis et al., 2023).

Root Fresh Weight

The results of the statistical analysis showed that the application of fertilization methods of the varieties of palm oil seedlings in the main nursery and the interaction between the two treatments showed a very significant effect on the root fresh weight parameters.

The results of the measurement test from observing the fresh weight of the roots of the palm oil seedlings can be seen in Table 7 and Figure 6 as follows:

Table 7. Mean Fresh Weight of Roots Palm Oil Seeds (g) at 28 WAP

Variety	Fertilization Methods				Average Vn
	Pocket	Sow	Sachet	Drip Fertigation	
..... g					
PPKS 718	55,7 c	54,0 b	47,8 a	50,0 a	51,9 a
PPKS 239	54,2 b	53,6 b	47,0 a	50,2 a	51,3 a
Total V x F	109,9	107,6	94,8	100,2	
Average Fn	55,0 c	53,8 b	47,4 a	50,1 a	

Description: Number followed by the same index in the same row or column showed no the significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ($\alpha = 0,05$)

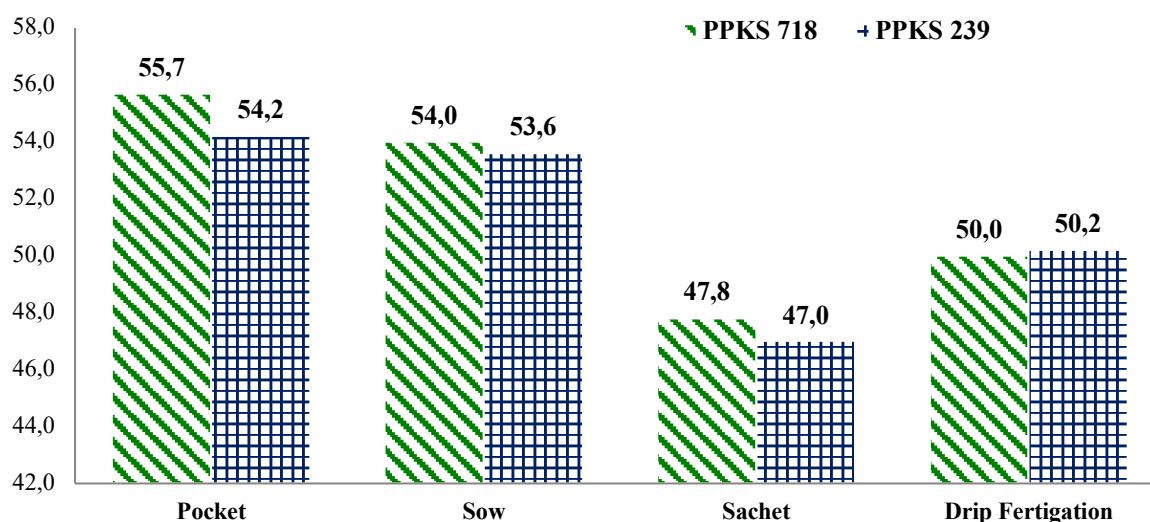


Fig 6. Graph of Mean Fresh Weight of Palm Oil Seedlings Roots at 28 WAP

The results of statistical analysis showed that the application of fertiliser methods on two varieties of palm oil seedlings in the main nursery and the interaction showed significantly different effects on root fresh weight.

Based on the results of the study, it was found that the treatment of pocket fertilization method was the highest average measurement of root fresh weight and significantly different at 55.7 g on PPKS 718 varieties, but not significantly

different from PPKS 239 varieties on pocket and sow fertilization methods and significantly different on sachet fertilization and drip fertigation methods.

This shows that the pocket fertilization method is suitable and good for the right method of application and the plant absorbs the nutrients applied and can increase absorption from the roots to the rest of the plant.

Head Dry Weight

The results of statistical analysis showed that the application of fertilization methods to varieties of palm oil seedlings in the main nursery and the interaction between the two treatments showed a very significant effect on the canopy dry weight parameters.

The results of the measurement test from observing the dry weight of the canopy of palm oil seedlings can be seen in Table 8 and Figure 7 as follows:

Table 8. Average Canopy Dry Weight of Palm Oil Seeds (g) at 28 WAP

Variety	Fertilization Methods				Average Vn
	Pocket	Sow	Sachet	Drip Fertigation	
	 g				
PPKS 718	49,0 d	47,8 b	46,0 a	45,7 a	47,1 a
PPKS 239	48,8 c	46,8 a	45,1 a	45,9 a	46,7 a
Total V x F	97,8	94,6	91,1	90,4	
Average Fn	48,9 c	47,3 b	45,6 a	45,2 a	

Description: Number followed by the same index in the same row or column showed no the significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ($\alpha = 0,05$)

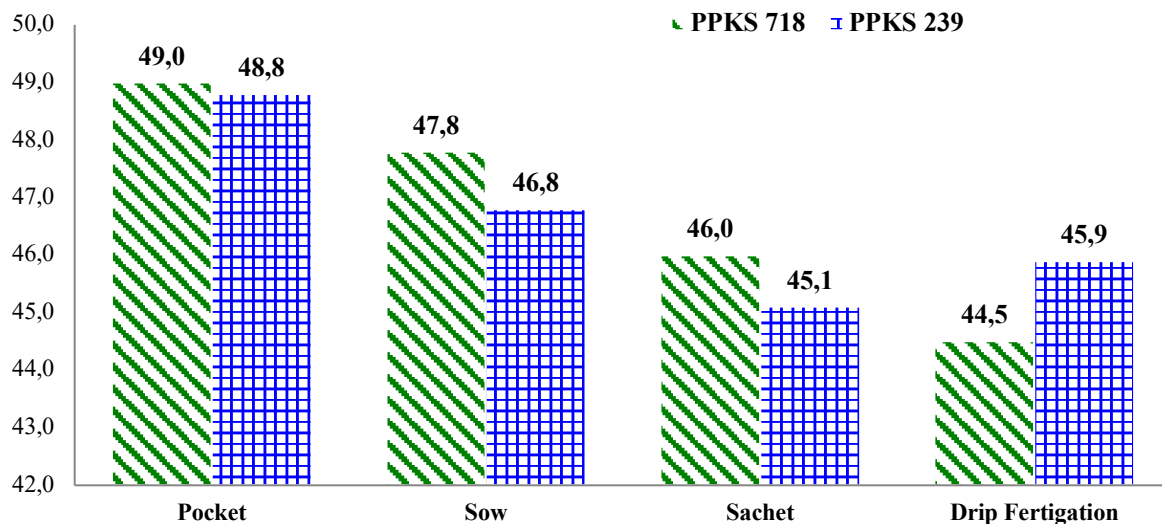


Fig 7. Graph of Average Canopy Dry Weight of Palm Oil Seedlings at 28 WAP

Based on the results of the analysis on the parameter of crown dry weight with fertiliser method treatment on varieties showed a real effect, on seed varieties showed no real effect, and the interaction showed a real effect on the parameter of crown dry weight..

This is due to the application of fertiliser by pocket method, due to the photosynthate translocation process that occurs due to the nutrients given and well received by the plant

Root Dry Weight

The results of statistical analysis showed that the application of fertilization methods to varieties of palm oil seedlings in the main nursery and the interaction between the two treatments showed a very significant effect on the root dry weight parameters.

The results of the measurement test from observing the dry weight of the roots of palm oil seedlings can be seen in Table 9 and Figure 8 as follows:

Table 8. Average Dry Weight of Palm Oil Seeds Roots (g) at 28 WAP

Variety	Fertilization Methods				Average Vn
	Pocket	Sow	Sachet	Drip Fertigation	
	 g				
PPKS 718	17,9 a	17,0 a	15,8 a	16,8 a	16,9 a
PPKS 239	17,2 a	17,0 a	15,7 a	16,2 a	16,5 a
Total V x F	35,1	34,0	31,5	33,0	
Average Fn	17,6 b	17,0 b	15,8 a	16,5 ab	

Description: Number followed by the same index in the same row or column showed no the significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ($\alpha = 0,05$)

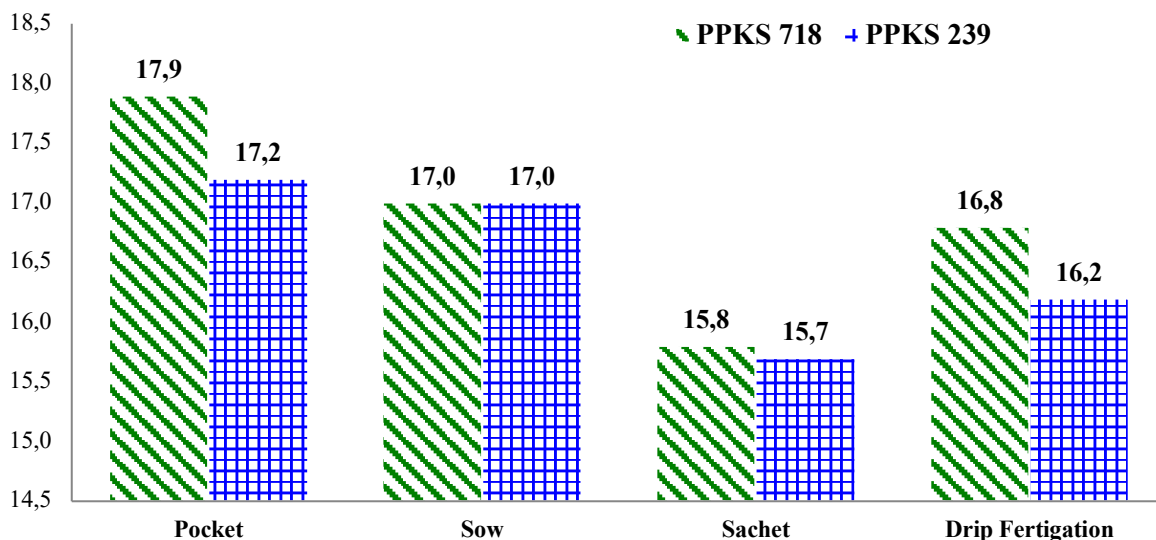


Fig 8. Graph of Average Dry Weight of Palm Oil Seedlings Roots at 28 WAP

The results of statistical analysis showed that the root dry weight parameter of palm oil seedlings with various treatments of fertilization methods on palm oil seedling varieties produced a significant effect on the root dry weight parameter of palm oil seedlings. But it is not significantly different from the variety of palm oil seedlings, fertilization methods and the interaction of the two treatments.

This is because the real effect on the root dry weight of palm oil seedlings is that the roots of palm oil plants have absorbed NPK + Mg + Ca nutrients well in the pocket fertilization method, but the sowing fertilization method gives the same results in both varieties. Unlike the sachet and drip fertigation methods, because of this fertilization method, the roots of palm oil seedlings have not optimally left nutrients in the roots when the roots

are dried, meaning that the roots of palm oil plants have not optimally absorbed nutrients.

CONCLUSION

The pocket fertilization method gives positive results on the growth of palm oil seedlings and provides effective results in fertilization, both for PPKS 718 and PPKS 239 varieties. The best growth of palm oil seedlings is found in the PPKS 718 variety, and the interaction effect between

PPKS 718 and PPKS 239 varieties with the pocket fertilization method occurs in good growth in the parameters of plant height, stem circumference, number of leaf midribs, leaf midrib length, fresh and dry weight of the crown, fresh and dry weight of the roots

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